3. Broadband Deployment Will Stimulate Sales of Complementary Monopoly Services

Broadband deployment is also attractive for ILECs because it will assist them in their efforts to provide unregulated ISP services and become players in the booming Internet business. A countervailing factor is that xDSL deployment could slow the growth of highly profitable second lines to the extent that a single xDSL line is a substitute for household or business data line. However, it appears that at least some ILECs are provisioning xDSL as a data-only line. In any event, at least some portion of second line growth is explained by factors other than data.

4. Deployment Is Less Risky Than Research and Development

Innovation can be usefully described as taking place in several stages. The riskiest part of broadband development is at the basic research and manufacturing stages. At these stages of the innovation process, firms must undertake investments even though there may be no payoff at all. The ILECs argue that they face the similar risk that investments they make to deploy broadband capability will not be recovered. However, the technology used to provide broadband service is largely "scalable." That is, investment can be made as demand arises. There are obviously fixed costs associated with making the telephone plant ready for broadband service. However, once these fixed costs are incurred, the expensive electronics associated with providing service to individual customers can be added on a customer by customer basis. For example, digital subscriber loop access multiplexer ("DSLAM") circuit boards typically serve four customers each. Therefore, the DSLAM circuit boards can be added as customers are added.

The ILECs also argue that their risk is increased by resale and unbundling requirements. However, as long as the unbundled network elements and wholesale discounts are set at appropriate levels, this risk should be minimal. If these prices are too high, the risk is actually greater that competitors will subsequently substitute their own facilities for those of the ILECs. By being first to market with reasonably priced broadband facilities, the ILECs can put themselves in a strong competitive position. The fact that ILECs in general propose that UNEs be priced substantially above economic cost suggests that they do not place great emphasis on this competitive risk.

5. Innovation by Competitors

Competitors have been active in innovating in the broadband area. As noted above, broadband capability is being deployed at a phenomenal rate in the competitive long distance business. In the local exchange area, competitive access providers ("CAPS"), the precursors of today's CLECs, were the first to deploy SONET based fiber rings in local areas – forcing the ILECs to respond.[43] Long distance competition also contributed to substantial innovation. In the 1980s competitive long distance carriers forced AT&T to deploy fiber and digital switching much more rapidly than AT&T, with its monopoly mindset at that time, was planning.

Competition has also played a key role, outside of core telecommunications markets. The Internet is perhaps the most important innovation of this century. The development of the Internet took place without the participation of the monopoly local telephone companies.

Similarly, as discussed in Section II, the CLECs are engaged in the next generation of broadband innovation. Most CLECs started life as CAPs, whose very reason for existence was to bring broadband service to large business customers. They are now expanding into other segments of the local telephone market, including the small business segment.

C. Safeguards Are Necessary

As discussed above, competition can be expected to lead to broadband innovation. However, competitors will be unable to innovate unless they have non-discriminatory access to the essential building blocks of the local telephone network. Unreasonable discrimination is, of course, contrary to the Communications Act, and the Commission has developed a number of rules, including Open Network Architecture ("ONA"), designed to prevent it. In recognition of the failure of past Commission efforts to prevent this kind of discrimination, the '96 Act required resale and network unbundling, and in the case of the RBOCs, separate subsidiaries for the provision of interLATA services.

The problem is that the opportunity for discrimination is too great, and the incentives to use it are too powerful. That is why the Commission is considering a new set of safeguards for broadband and is strengthening the old ones, which have proved largely ineffective. Section 1 discusses the ways in which an ILEC could discriminate against competitors. Section 2 describes the separate subsidiary safeguard, while Section 3 discusses the other safeguards ordered by the Commission.

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[43] See, e.g., Jonathan Kraushauer, Fiber Deployment Update, End of Year 1997, Common Carrier Bureau, FCC, 1997.

1. Discrimination

ILECs have no positive incentive to cooperate with potential broadband competitors. By denying, delaying, or overcharging for access to the essential network elements required by competitors, competition and the consumer benefits that competition will bring can be delayed, or even eliminated. The unbundling and resale provisions of the '96 Act were supposed to reduce the potential for discrimination by providing competitors with cost-based access to the efficiencies inherent in the network. The anti-discrimination provisions of the '96 Act are not working as intended. The Commission's implementation has been somewhat neutralized by legal actions brought by ILECs. Even the remaining portions of the Commission's rules implementing the Act are not working as intended. Loops are expensive and their provision is hampered by inadequate OSS systems. ILECs have simply refused to make available critical network elements that will be needed by broadband competitors, such as access to facilities at the subloop level.

These problems are particularly important in the case of competitive broadband deployment. The Congress recognized the danger in allowing the RBOCs to provide services in competition with interLATA carriers and required strict compliance with a checklist of items prior to entering the interLATA market. ILEC provision of broadband services presents similar problems. However, the Commission is proposing for broadband services a market model that the Congress determined was too risky for long distance. This makes it essential that effective safeguards be in place as soon as possible. The quickest way to open local markets for broadband competition would be to require

ILECs to make the prerequisite unbundled services available to CLECs as soon as possible.

Solving the interconnection problems that have been identified to date may be possible with vigorous enforcement. However, technology is changing rapidly and the technological changes that will underlie broadband networks of the future are endogenous. That is, the ILEC can choose how and when to modify networks and deploy technology. This is illustrated by looking at some basic decisions that ILECs must make when they design and deploy their networks.

a. Network Architecture

The first, and most fundamental, decision in the creation of any network is the choice of the basic architecture. The concept of a network architecture includes not only the choice of a topology (e.g., star, ring, bus or some hybrid combination), but also choices such as (a) how the network is to be broken down into functional hardware and software "building blocks," (b) at what points the building blocks connect and how the connections, or interfaces, are defined, (c) which protocols are chosen to allow these functional building blocks to communicate with one another (i.e., the signaling scheme), and (d) whether the architecture is open or closed.[44] Through these architectural choices, which are highly technical in nature, the ILECs can discourage, or even thwart entirely,

[44] At first glance, it might appear that the basic architecture of the local exchange portion of the public switched telephone network is already well established and more or less immutable. This is decidedly not the case. For example, the ILECs are currently experimenting with dual ring architectures rather than the traditional hierarchical star for interconnecting nodes in the local network. As noted previously, they have also spent enormous sums defining a new architecture built around the N-ISDN concept, and they currently are field testing architectures for broadband local distribution.

certain types of competitive developments.[45] For instance, the ILECs could choose to deploy xDSL over digital loop carrier systems ("DLC") in a fashion that favors the ILEC subsidiary through the consumption of spare fibers that are not available to other entities, preferential upgrades in the capacity of the DLC electronics, and so on.

Moreover, by tightly bundling together the signaling, information transport, control, data processing, and information storage and retrieval portions of the broadband network, they can make it difficult, if not impossible, for CLECs to survive. For instance, they can choose to deploy xDSL in a fashion that only allows its data stream to be sent to one ISP, rather than using it to provide access to an underlying ATM switched service that can send data to numerous internet and other broadband service providers. This, combined with an xDSL ordering procedure that treats the ILEC's own ISP preferentially – for instance, by having the customer service representatives who are arranging for xDSL service imply that service can be provided faster or more easily if the affiliated ISP is utilized – will provide a substantial advantage to the affiliate.[46]

Similarly, by bundling together information storage and retrieval systems, such as electronic mail and fax servers and web sites, with their switching machines without clearly-defined, open interfaces between the two, the ILECs' can artificially encourage

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[45] An historic example that illustrates this type of activity is the provision of CENTREX services. Prior to divestiture, AT&T had a widely-recognized strategy of migrating customers from central-office-based CENTREX services to customer-premises-based PBX equipment. With divestiture, the RBOCs resurrected CENTREX and made it a "flagship" service to compete with PBXs. Of the two principal kinds of N-ISDN interfaces, the BOCs have placed heavy emphasis on the one that works in conjunction with CENTREX at the expense of the other that is utilized by PBXs. Thus, in this case, a decision pertaining to the architecture of the basic exchange network is providing a competitive advantage for CENTREX vis-a-vis PBXs.

[46] ISPs are already complaining about such problems. See Before the Minnesota Public Utilities Commission, In the Matter of an Investigation Into U S West Communications Provision of MegaBit

the utilization of their own data processing services and equipment. It should be emphasized that the ILECs are already installing such information processing, storage and retrieval systems in conjunction with their "Advanced Intelligent Network" offerings. By denying competitive information service providers unbundled upstream signaling or information capacity on their network, the ILECs can artificially induce them to utilize the ILEC downstream broadband transmission capacity. In the Internet world, the bundling of application services such as web hosting with internet transport is already well underway; the ILECs have a clear motivation to similarly bundle transport and applications in their ISP offerings. Finally, by integrating switching and transmission without well-defined, open interfaces, or by denying or hampering collocation opportunities that are necessary for CLECs to efficiently handle their broadband data streams, the ILECs can artificially induce, even force, competing information service providers to utilize their switching, when those providers may only require ILEC loop facilities.

There is also increased interest in multimedia information services that combine audio, text, and video information. Consider an electronic version of classified or display advertisements that allow the advertiser to furnish added text, still pictures, or even video clips of the product or service being offered for sale. By bundling together switching, signaling, transmission, and information processing, storage, and retrieval systems, the ILEC's can artificially induce the provider of such content-oriented information services to utilize the ILECs' downstream transmission capacity, switching, signaling, and

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Services, Docket No. P421/EM-98-471, Complaint of the Department of Public Service and the Office of

information processing, storage and retrieval systems. This not only gives business to the ILECs, but limits the types of information services, inducing designs compatible with the ILECs' own systems. In this way, the ILEC's can extend their current monopoly power over the local loop into the broadband world and into adjacent information service markets as well.

b. Network Design

After the choice of basic architecture, the next step in the creation or evolution of a network is the detailed design according to the chosen architecture. Certain designs can facilitate competition, while other designs can thwart it. For example, the original Bell Laboratories design for cellular mobile radio systems called for treating the associated mobile telephone switching offices (MTSOs) like any other local telephone company (i.e., Class 5) switching office in the switching hierarchy. When it became apparent that the FCC was going to permit a second, competitive cellular carrier in every market, the ILEC's tried to insist that the second carrier be interconnected technically like a private branch exchange (PBX) rather than like another Class 5 office. This less efficient form of interconnection hampered the ability of the non-ILEC cellular carrier to compete with the ILEC's cellular subsidiary.

c. Network Deployment

Still another step in the creation or evolution of a network is the actual deployment of the necessary systems or subsystems. Because of the vast size of the ILEC local exchange networks, it is typically not feasible to "roll out" new systems or new

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Attorney General, September 10, 1998.

capabilities simultaneously throughout the network. For example, the equal access provisions of the MFJ could not be implemented simultaneously on all switches. The same problem appeared in the ONA deployment plans of the BOCs. This gives the ILEC's the ability to implement certain changes in the network in an order that advantages their own competitive operations at the expense of competitors who are dependent upon the network.

Even more likely, it gives each ILEC the opportunity to delay changes that would benefit a competitor until the ILEC is itself ready to take advantage of the change. For example, by selectively deploying xDSL capabilities in a random fashion throughout the network, or by withholding or delaying competitors' opportunities to collocate in ILEC central offices and at DLC remote terminal sites, the ILEC can make it difficult for a competitor to introduce a service that requires broadband access. Exactly this pattern of behavior has been perceived by information service providers with respect to the original BOC plans for deploying ONA capabilities in their networks. In the context of broadband competition, ILECs claim that conditioning loops so that competitors can provide advanced services over them is tantamount to provisioning of a "superior" network, which has been found unlawful by the 8th Circuit.

d. Tactical Decisions

What has been described thus far are the strategic ways the ILECs can extend their existing monopoly power into the broadband world and at the same time extend that monopoly power into adjacent information service markets as well. The description has not included more day-to-day tactical methods by which the ILEC's can technically and operationally discriminate, such as in provisioning, quality, maintenance, restoration, etc.

Once a network is in place and meets standards, it must be operated, monitored, tested, and maintained to ensure that the established quality standards continue to be met. The ILEC can discriminate in favor of its competitive operations in the process of providing necessary services, because it can expedite service to its own competitive operations while delaying it to outside firms that are dependent upon the same offerings.

These potential problems are particularly significant for data loop provisioning. Data loop provisioning is currently largely a manual process. This provides abundant opportunities for discrimination. ILECs have argued that manual processes should be free from performance measures, and data loop provisioning need not be a separate reporting category.

An ILEC can also discriminate by doing a better job of operating, monitoring, testing, and maintaining those portions of its network upon which its own competitive operations depend. Similarly, an ILEC can notify its competitive operations sooner when there are network problems, so that the ILEC affiliate can take immediate steps to mitigate the problem and improve customer satisfaction. And, when service is lost for some reason, the lines that the competitive operations are dependent upon can be restored sooner than those lines that belong to competitors.

ILECs maintain that opportunities to discriminate are reduced or eliminated by modern operations systems, because such systems cannot realistically differentiate between facilities used for ILEC and competitor services. However, this argument is based on an incomplete portrayal of all the phases of operations. There are still ample opportunities to discriminate, both "upstream" of these systems, by deploying them in a pattern that favors areas where ILEC facilities are concentrated, and "downstream" of

these systems in maintenance and repair activities conducted by ILEC craft personnel. It is thus not unreasonable to hold that new operations technology actually increases the opportunity for discrimination by making it possible to greatly improve operations where deployed, then having the ILECs favor themselves in the deployment pattern they implement.

e. Network Evolution

One additional step beyond day-to-day operations that is controlled by the ILECs is the evolution of the network itself. As noted earlier, self-instigated ILEC changes may be discriminatory. Discrimination is likewise possible when a competitor dependent upon the ILEC local exchange monopoly wants some change made in the features or functionality of the network in order to offer a new or better service. The ILEC might refuse to offer some types of network interfaces needed by competitors, such as the ability to access the DLC Remote Terminal in an appropriate fashion, or obtain desired AIN-based call processing features.

The critical facts are that the outside competitor is forced to negotiate with its competitors – i.e., the ILEC(s) – and that the ILECs have the ability and the incentive to treat the competitor poorly. For example, they have the power and the incentive to extract competitively sensitive information and to delay implementation of the requisite network changes until their own competitive operation is in a position to take advantage of the proposed change. This is particularly relevant to the present analysis' concern with technical discrimination, because technical arguments are almost always the first line of defense when the ILECs would benefit by delay.

A familiar scenario would run as follows. The competitor desires to offer a new service or feature that requires a particular technical change in the network. The competitor asks for the change to be made in the network. The ILEC professes not to understand the request technically, implying perhaps that the outside competitor may not be fluent in the telephone vernacular, or fully aware of the technical and operational capabilities of the network. These initial challenges can be quite discouraging. After considerable delay, the ILEC might then indicate that it understands what is desired technically, but that it is technically infeasible. After considerable additional negotiations and interminable meetings, the ILEC might then say that it is technically feasible after all, but that it will take years and prohibitive amounts of money to engineer and implement the needed changes in the network. Meanwhile, the ILEC can be developing its own competitive "fighting machine," dependent upon the needed change in the network. When that development is near completion, the required network change might finally be deemed feasible. Each of these tactics would be difficult to prevent by regulation.[47]

f. Procurement Decisions

The public policy problems associated with the choice of an optimal network architecture are compounded by the fact that the ILEC's have the power to drive the choice in a less than optimal direction to fit their own private, strategic business interests. This ability to drive technology in a particular direction stems from two sources. First, they have enormous monopsony power. That is, the ILECs could signal their suppliers

[47] Problems of this general nature were discovered in the Georgia Public Service Commission investigation of BellSouth's Memory Call service. See In the Matter of the Commission's Investigation into Southern

that they think the future access network should deploy fiber to the curb, rather than extending the capabilities (and the economic life) of existing twisted pair cable plant by deploying xDSL. In this case, the research and development efforts of suppliers will naturally concentrate on the fiber-based technologies, creating a situation in which an overly-expensive network is deployed, causing financially-fragile competitors to pay more for broadband access to customers than they would if xDSL had been deployed instead.

Second, the ILECs can act in concert in the various domestic standards bodies and industry forums in which they have a dominating presence, in order to artificially drive the technology toward an integrated solution requiring enormous new investments, or towards a solution they believe they are in a better position to support than are their competitors. For instance, by creating a standard for the integration of digital loop carrier central office terminals into their switches, they are able to argue that it is costly and inefficient to provide competitors with unbundled loops.[48]

g. The History of ONA

In the context of information services, the Commission decided to deal with the analytically equivalent discrimination problems by substituting ONA for a separate subsidiary requirement. In Computer Inquiry III, the Commission ordered the ILECs to unbundle their local exchange networks and to provide the resulting basic building blocks to others on a non-discriminatory basis. Such unbundling was to be a quid pro quo for

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Bell Telephone and Telegraph Company's Provision of Memory Call Service, Georgia Docket No. 4000-U (June 4, 1991).

the removal of the existing structural safeguards (i.e., the separate subsidiary requirements).

It is clear that, at best, ONA addressed only some of these potential discriminatory devices. In fact, the BOCs have a long history of thwarting the Commission's Open Network Architecture (ONA) policies by failing to deliver the network unbundling originally promised and by failing to honor requests for new services and features from information service provider customers.[49]

Fortunately, the failure of the Commission's ONA policies did not interfere with the development of the information service market. The Internet developed in spite of the ILECs' failure to unbundle their networks because simple dial-up connections were adequate. However, the very success of the Internet is now placing demands on those connections that are harder and harder to meet.

There are several lessons to be learned from the ONA experience. First, non-structural safeguards are difficult to enforce. Second, promises of unbundling should not be treated as a substitute for the real thing. Finally, structural safeguards may be required to ensure that consumers receive all of the benefits of next generation local loop technology.

2. Separate Subsidiaries

Separate subsidiaries can deal with some of the problems identified above, but only if the line between the parent and the subsidiary is drawn in the right place. Section

[48] As noted elsewhere, Even if integration may achieve nominal gains in efficiency, society would be better off, both in cost and innovations, with a slightly less efficient network that encouraged more robust competition.

a. discusses the benefits and limitations of separate subsidiaries. The critical boundary issue is discussed in Section b. while Section c. describes how the Commission's separate subsidiary safeguards can be strengthened.

a. The Economics of Separate Subsidiaries

Separate subsidiaries do not change incentives. The economic incentive of any firm is to maximize profit. The economic incentive of a firm with monopoly power over essential inputs needed by firms with whom it competes downstream is to maximize profits by discriminating against its competitors. Putting the potentially competitive downstream business in a separate subsidiary does not change these incentives.

A separate subsidiary requirement can aid in the enforcement of non-discrimination requirements. By making transactions between the upstream monopoly and the downstream competitive business more transparent, it is theoretically easier to detect and remedy certain forms of discrimination. But these benefits cannot be realized without enforcement. The monopoly firm will try to evade non-discrimination requirements.

If technology were static, and transactions between the parent and the subsidiary fairly simple, separate subsidiaries could be relatively self-policing. However, the discussion in Section IV.C. above shows that this is not the case. With changing technology and markets, there will be many opportunities for the parent to discriminate in favor of the subsidiary. With these limitations in mind, separate subsidiaries should be designed to maximize the potential for detection of discriminatory behavior.

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[49] See Hatfield Associates, Inc., "ONA: A Promise Not Realized – Reprise, April 6, 1995 for a detailed

b. Boundary Issues

A critical element of any separate subsidiary scheme is that monopoly and competitive elements are separated. If there are monopoly elements in the subsidiary, the entire basis for creating a deregulated subsidiary is destroyed. This is in fact how the Commission has approached separate subsidiary issues in the past.[50] One flaw in the Commission's current proposal is that the line between competitive and monopoly elements has not been drawn carefully. The Commission has apparently drawn the line between narrowband and broadband technologies – even though, as discussed above, the ILECs will retain monopoly control over critical broadband technologies.

Deregulation of a separate subsidiary is justified only if the degree of separation sufficiently limits discrimination and if the monopoly elements of the combined firm are in the regulated parent. Obviously, if the subsidiary begins life with control over facilities that have monopoly characteristics, competitive provision of broadband services will be thwarted. In other words, if the subsidiary has control over elements of the local exchange network that are essential to the competitive provision of broadband services, then the entire theory on which the separate subsidiary proposal is built fails.

It does not matter whether the elements that confer monopoly power are new and therefore not widely deployed. Just because technology changes does not imply that competition is the inevitable result. For example, none of the following new technologies changed the monopoly characteristics of the local networks: touch tone, digital

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discussion of the failure of the Commission's Computer III policies.

[50] Amendment of Section 64.702 of he Commission's Rules and Regulations (Second Computer Inquiry), CC Docket 20828, Final Order, 77 FCC 2d 384 (1980) ("CI II").

switching, fiber optic transmission, SS7, or AIN.[51] Clearly, deregulation of the provision of local services using these technologies would have been a mistake.

To make this concrete, if it turns out that broadband competition will not be possible unless competitors have access to DSLAMs, then allowing the ILEC to put DSLAMs in the unregulated subsidiary will effectively kill prospects for competition. This issue is discussed in detail in Section V. below where the economics and technology of both xDSL and potential successor technologies are discussed. The conclusion is that if broadband competition is to evolve, then CLECs must be given non-discriminatory access to end-to-end digital connectivity. That is, CLECs must be able to obtain on a transparent basis the digital bits originated by their potential customers. What this means is that if an ILEC subsidiary and competing CLECs are to have an equal opportunity to compete for the broadband business of a customer, the network elements that enable digital connectivity must be in the parent.

This leaves the question of what functions remain in the subsidiary. Essentially, the subsidiary will be in the position of marketing broadband services to consumers based on the purchase of the network elements supplied by the parent. The substantial advantage to the ILEC of establishing such a subsidiary will be that the services can be offered to consumers free from the maximum price regulation that applies to narrowband services.

c. Separate Subsidiary Requirements

[51] As noted above, it was not necessary to promise deregulation or higher profits in order to induce telephone companies to introduce these technologies.

The theory of the separate subsidiary is that the monopoly parent will be forced to treat its competitive subsidiary the same as all other competitors. Indeed, the theory underlying the Commission's approach is that innovation in the underlying monopoly network will be stimulated by the requirement that the monopolist make service available to all across an arms-length bargaining relationship.

As discussed above, the basic weakness of any separate subsidiary scheme is that as long as the monopoly parent firm and the separate subsidiary share common ownership, the incentives of the combined firm do not change. In other words, the objective of the combined firm will be to maximize firm-wide profits. If high prices for interconnection will maximize firm-wide profits, then high prices will be charged even if the subsidiary will lose money or fail to grow as rapidly. The most significant concern, however, is that the parent will find ways to discriminate in favor the subsidiary. As discussed in Section IV.C. above, favoritism towards the subsidiary can take many forms – particularly when technology is changing. Rules can only go so far in anticipating the problems.

The conditions the Commission has proposed for separate subsidiaries are all appropriate. The Commission's Non-Accounting Safeguards Order, which serves as the basis for proposed rules discusses these issues in detail. However, the proposed rules can be strengthened in several respects. Additional requirements are discussed below.

The first concern the Commission must address is that the parent retain all the functionality required to provide unbundled broadband elements to the competitors of the subsidiary. For example, in addition to retaining end-to-end broadband functionality in

the parent, the parent must also be able to provide network installation and maintenance to the CLECs purchasing broadband UNEs.

Second, perhaps one of the most valuable preferences that the parent can bestow on the subsidiary is human capital. At the onset of operation, the subsidiary will be staffed with employees trained at the ILEC's expense. Even more troublesome is the fact that moving employees from the parent to the subsidiary, and vice versa provides an easy way to establish preferential information flows concerning such matters as network developments, deployment, space availability, etc. After the subsidiary is established, there should be limits on employee transfers. At a minimum, transfers should be reported. In addition, any training expenses incurred for an employee of the parent who is transferred to the subsidiary within one year of the training should be charged to the subsidiary.

Third, the Commission should consider requiring outside ownership of the subsidiary sufficient to trigger SEC financial disclosure rules. Placing the fiduciary duty to promote the interests of all shareholders on the officers of the subsidiary may help in preventing some forms of egregious anticompetitive behavior on the part of the subsidiary. However, this safeguard will not prevent the parent from favoring the subsidiary since that will be in the financial interest of all the shareholders of the subsidiary. Also note that if strategic or anticompetitive pricing is in the interest of the subsidiary, outside ownership will make no difference. However, if the combined parent and subsidiary are engaged in price squeezes that reduce or eliminate the margins on competitive services, minority shareholders would be justifiably concerned and perhaps motivated to take action.

Fourth, one suggestion advanced in the Commission's proceeding on non-accounting safeguards for the Section 272 subsidiaries of the RBOCs was to require that any incentive payments for employees of the subsidiary be tied only to the financial performance of the subsidiary.[52] This safeguard may help to separate the incentives of the parent from the incentives of the subsidiary.[53] The Commission rejected that safeguard in that proceeding. However, in light of the importance of the development of broadband services to the economy, additional safeguards may be necessary, particularly if they impose little cost on the subsidiary.

Pricing is also a critical issue. The subsidiary may price services below levels that a truly competitive firm would charge. While the subsidiary may not earn a competitive return, the strategic interests of the firm as a whole could be met. Price squeezes of this sort have been addressed in the past with imputation rules. The imputation safeguard is far from adequate because it is difficult to enforce when cost and rate structures are complicated. Nevertheless, some basic form of imputation may be required. Since this problem applies whether or not a subsidiary is required, it is discussed in more detail in Section IV.3.c. below.

3. Collocation, Unbundling, and Pricing Rules

In addition to the separate subsidiary safeguard, strengthened collocation and unbundling requirements are intended by the Commission to protect competitors against

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[52] In the Matter of Implementation of the Non-accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as amended, CC Docket No. 96-149, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd. 21905 (1997).

[53] As discussed above, anything short of a complete divestiture will not result in a total separation of incentives of the parent and the firm. The parent, who ultimately controls the subsidiary, is interested in maximizing firm-wide profits and will take steps to ensure that this will happen.

discrimination. This is an essential element of the Commission's model. The ILECs are already subject to unbundling and collocation requirements and these have proven difficult to enforce. This is a particularly significant issue because ILECs may choose not to adopt the separate subsidiary approach, preferring instead to provide regulated broadband services at the same time that they are denying adequate access to competitors – just as they are doing now with both narrowband and emerging broadband services. Therefore, it is essential that these safeguards be strengthened.

a. Collocation

The Commission's Order recognizes the importance of collocation to the competitive provision of xDSL services and requires several improvements in provisioning of collocation space. Northpoint Communications has produced a set of collocation principles that will help the Commission define the necessary parameters for collocation.[54] These principles include the following:xxx

- Require ILECs To Submit Detailed Floor Plans To State Commissions And Interested CLECs Wherever They Contend Space For Physical Collocation Is Unavailable.
- Require ILECs To Remove Obsolete Equipment And Non-Critical Administrative Offices In COs To Increase The Amount Of Space Available For Collocation.
- Prohibit ILECs From Warehousing CO Space For Themselves.
- Ensure Prompt Collocation Ordering Rights By Requiring ILECs To File Collocation Tariffs (Saves 2-6 Months)
- Require ILECs To Provide Collocation Quotes In 10 Days (Saves Up To Four Months)
- Require ILECs To Provide Standard Cage Completion Dates Of No Greater Than 90 Days For Conditioned Space
- Require ILECs To Provide Cages In Unconditioned Space In 120 Days

[54] See Northpoint Communications' Proposed Remedies For Promoting DSL Competition, copy on file with HAI.

- Require ILECs To Meet Their Cage Completion Intervals Or Face Withholding Of 271 Authority Or Other Sanctions
- Require ILECs Seeking Section 706 Relief To Lower Collocation Costs
- Require ILECs To Eliminate First-In Penalties For Unconditioned Space
- Require ILECs To Impute The Cost Of Collocation In Their Retail Tariffs
- Cageless Collocation Must be Made Available to CLECs at Charges Significantly Less Than Physical Collocation.
- The Commission Should Specifically Clarify that Digital Subscriber "DSLAMs" Can Be Placed in Collocation Cages.
- The Commission Should Specify that Remote Access Management Equipment and Retail Services Can Be Placed in Collocation Cages.
- ILECs Should Only Be Allowed to Subject CLEC Equipment to Legitimate Safety Standards.
- ILECs Should Be required to List All Approved Equipment and all Equipment They Use

If all physical collocation options are proven to be exhausted, virtual collocation should be provided at a non-affiliated CLEC's option. These principles appear reasonable. There is no *a priori* reason to believe that any benefits would be outweighed by legitimate ILEC cost claims.

b. Unbundled Network Elements

The discussion of the boundary between monopoly and competitive activities is relevant here. As discussed in Section V., broadband competitors require end-to-end digital connectivity from the customers' premises to the competitors' point of presence. Moreover, all essential elements needed by CLECs to provide competitive broadband services should be unbundled and priced at economic cost. Section V. discusses the unbundling requirements in detail. The set of UNEs necessary to assemble broadband services are listed as follows:

- Network Interface Device (NID)
- NID-mounted splitter
- Distribution facility

- Feeder/distribution interface
- Feeder facility
- Bandwidth enhancement device
- xDSL loop transport (DLC cases only)
- Broadband signal grooming
- Fast packet switching
- Broadband interoffice transport

In addition to those specified by the FCC, the set contains UNEs that are associated with xDSL-equipped loops and allow CLECs suitable access to such loops. The motivation for including these as UNEs is also discussed in detail in Section V below.

c. Pricing

The Commission needs to be concerned with strategic or anticompetitive pricing on the part of the ILEC that is designed to reduce broadband competition. Price squeezes are the most significant threat. Under a price squeeze, a firm supplying a monopoly input incurs less cost for the monopoly input than it charges its competitors. As a result, the competitors are unable to earn a profit even though they may be as efficient or more efficient than the monopolist. Modern economic theory recognizes the anticompetitive nature of such price squeezes. Raising the price of an essential monopoly input is a "raising rivals' cost" strategy.[55]

To take an extreme example, suppose an ILEC sells an unbundled xDSL loop to its CLEC customers for twenty dollars per month and that an equally efficient CLEC incurs five dollars per month in non-loop costs. If the ILEC charges its retail customers

[55] See, for example, Salop, S. and D. Scheffman, "Raising Rivals' Costs," American Economic Review, 73, May 1983.

less than twenty-five dollars for the complete xDSL service, the competitor is squeezed and cannot make a profit.

What if the actual cost of the loop is not twenty dollars, but fifteen dollars? If the ILEC charges its retail customer for the full unbundled loop charge plus the incremental cost of non-loop functions, then the ILEC can charge twenty-five dollars and make a contribution to overhead, while the CLEC is only recovering its incremental cost. The CLEC's total incremental cost is twenty-five dollars – the price of the loop plus the cost of other broadband functions.[56]

Note that imputation does not solve this latter problem. Under imputation, the monopolist charges its affiliate the same rate for the monopoly input, i.e., the loop, as it charges it competitors. But this does not change the fact that the cost of the loop to the competitors is the price charged by the monopolist while the monopolist's real cost is not the price it charges its affiliate, but the actual cost of providing the loop. This artificial cost advantage can reduce or eliminate competition. An equally efficient competitor would have to operate at a loss in order to attract market share from the incumbent.[57]

Moreover, imputation does not change incentives. Experience in administering the imputation rules shows that these rules are hard to enforce in the face of incentives for the local monopoly telephone companies to abuse them – and the incumbent telephone companies do indeed have these incentives. At the request of AT&T and MCI, in 1995 HAI reviewed imputation of access charges by New York Telephone ("NYT") for its toll

[56] This is not an academic problem. See Pacific Bell Telephone Company's Transmittal No. 1986 (June 15, 1998) and the Petition to Reject by NorthPoint Communications June 22, 1998.

and Regional Calling Plan ("RCP") services. The conclusion reached was that despite the New York Commission's imputation rules and policies, many NYT intraLATA toll services were priced too low to allow competing interexchange carriers to make a profit. The NYT imputation analysis contained unrealistically low costs of administration and marketing. As a result of this and other problems that were identified, NYT placed its competitors in a price squeeze. Thus, imputation as a competitive safeguard is flawed in both theory and practice.

The evidence from the interLATA market is that there will be a variety of pricing plans and frequent service innovations for broadband services. At best, regulators will be able to perform cursory imputation reviews of ILEC offerings. By the time reviews are completed, plans that fail an imputation test may have already damaged competition. As the experience in New York demonstrates, this problem is exacerbated by the fact that the issues surrounding a proper imputation can be quite complex. The bottom line is that pricing loops at economic cost is an essential competitive safeguard. If the ILEC is not earning excessive profits on the loop, it is less able to earn low or negative margins on the non-access portion of toll rates.

ILECs may argue that by squeezing broadband competitors, they will forego the revenues that they could obtain from CLEC purchases of inputs. However, squeezes will affect CLEC sales of broadband services over CLEC facilities. Moreover, in the context of broadband services, ILECs will have tremendous incentives to retain customer control because the firm that controls the loop has the potential to control the entire stream of

[57] Of course, it is expected that the CLEC would not necessarily be equally efficient at the outset of